Flight Object

Current Activities

Federal Aviation Administration

Presented to: FO Industry Day
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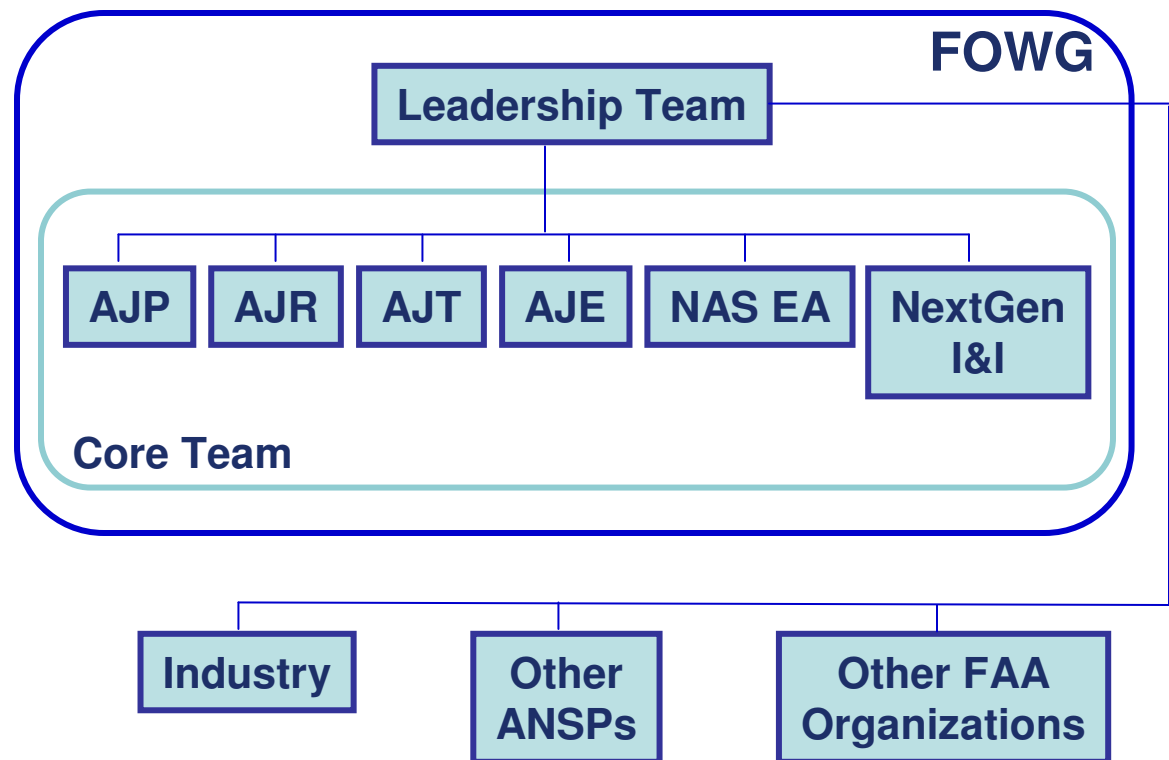Date: February 25, 2010

Activities

- **Flight Object Working Group**
  - Operational Need
  - FO Definition
  - KSN (Knowledge Service Network) Site
- **Process to Develop FO Data Standard**
  - ConUse/Scenario development
  - Data Identification
  - Structuring of Data
  - XML Schema
  - Data Dictionary
- **Flight Object 2-year work plan**
- **Demonstration plan**

A small and agile FOWG team will leverage a larger Flight Object community of interest

Cross-disciplinary and service domain group focused on identifying the necessary data, attributes, performance requirements and architecture alternatives to realize the NextGen vision.

- The **Leadership Team** sets the general direction for the Flight Object Working Group

- The **Core Team** represents the Flight Object Subject Matter Experts (SMEs); it includes members from a representative cross section of stakeholders. The Core Team will reach out for support to their organizations, other FAA organizations, the SWIM program, and the industry

FOWG

Leadership Team

AJP | **AJR** | **AJT** | **AJE** | **NAS EA** | **NextGen I&I**

Core Team

Industry | **Other ANSPs** | **Other FAA Organizations**

KSN Site

- ## Support FOWG Activities

  - Document Sharing

  - Collaboration

  - Versioning

  - Discussions

The FO is dynamic; the iterative approach can be used to manage the FO's evolution over time
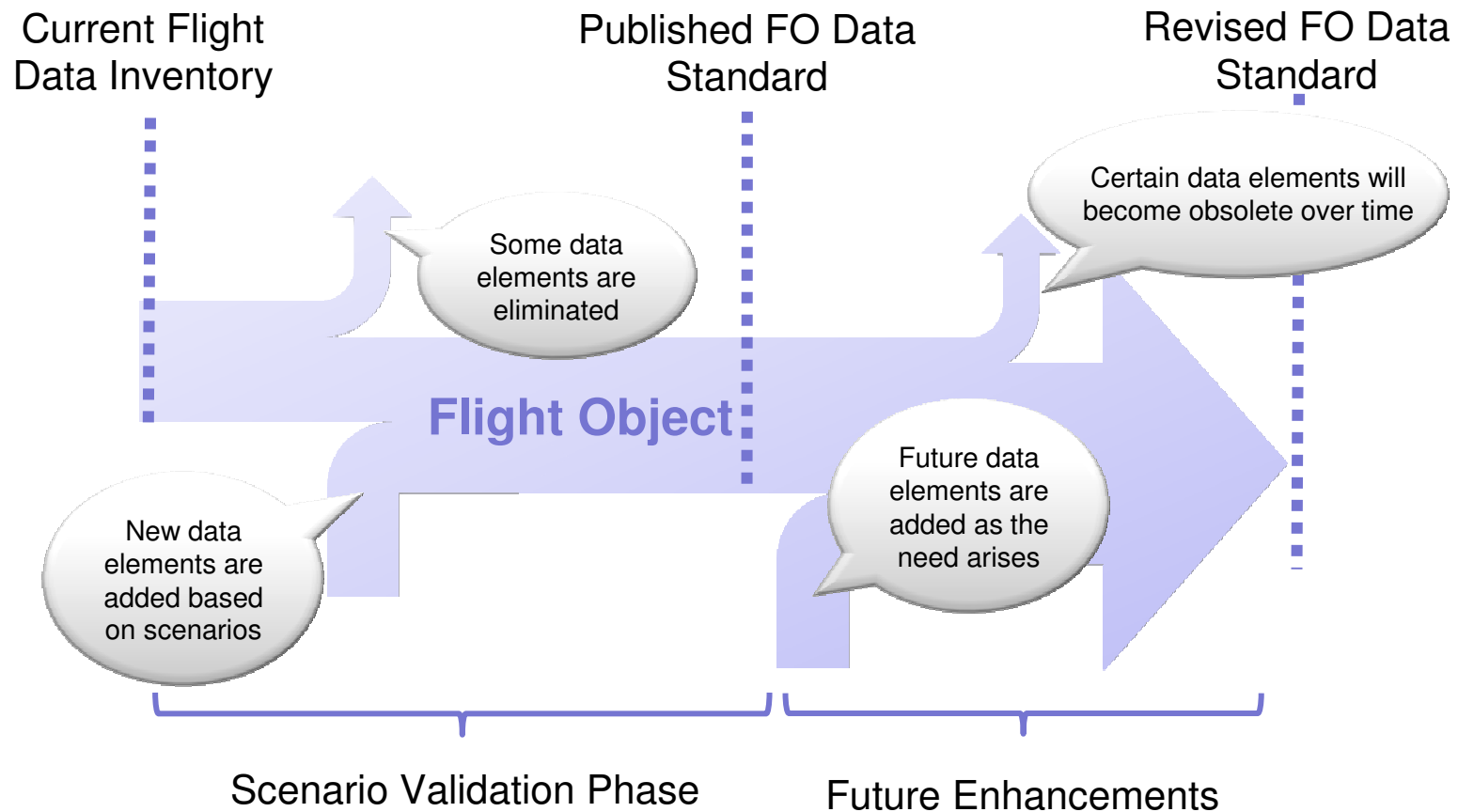
The Process: *Getting to a Standardized Flight Data, ConUse & FO Requirements*

Identify the data elements	ID Important Scenarios

→ *Data element Collection & Documentation*

Describe data creation/update	Describe data use

→ *Document Operational Use Cases*

ID data constraints	Define data structure

→ *Actors / Systems roles & responsibilities*

Standardized Flight Data

Validate structure against scenarios and constraints

→ **FO Concept of Use**

Goal

Feasibility, performance evaluation

→ **FO Requirements**

Identify Data Elements

Flight Object

Data Element

Data Element

Data Element

■ ■ ■

Example complex type

Data Element

Data Element ← *Simple type*

Data Element

Data Element

Data Element

Data Element

Focusing on interfaces & common applications:

- **Define data elements**
  - Elements may be **simple** (e.g. longitude), **complex** (e.g. position).
  - Complex elements may be nested (e.g., trajectory)
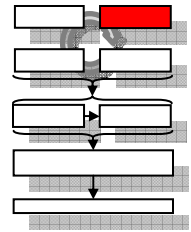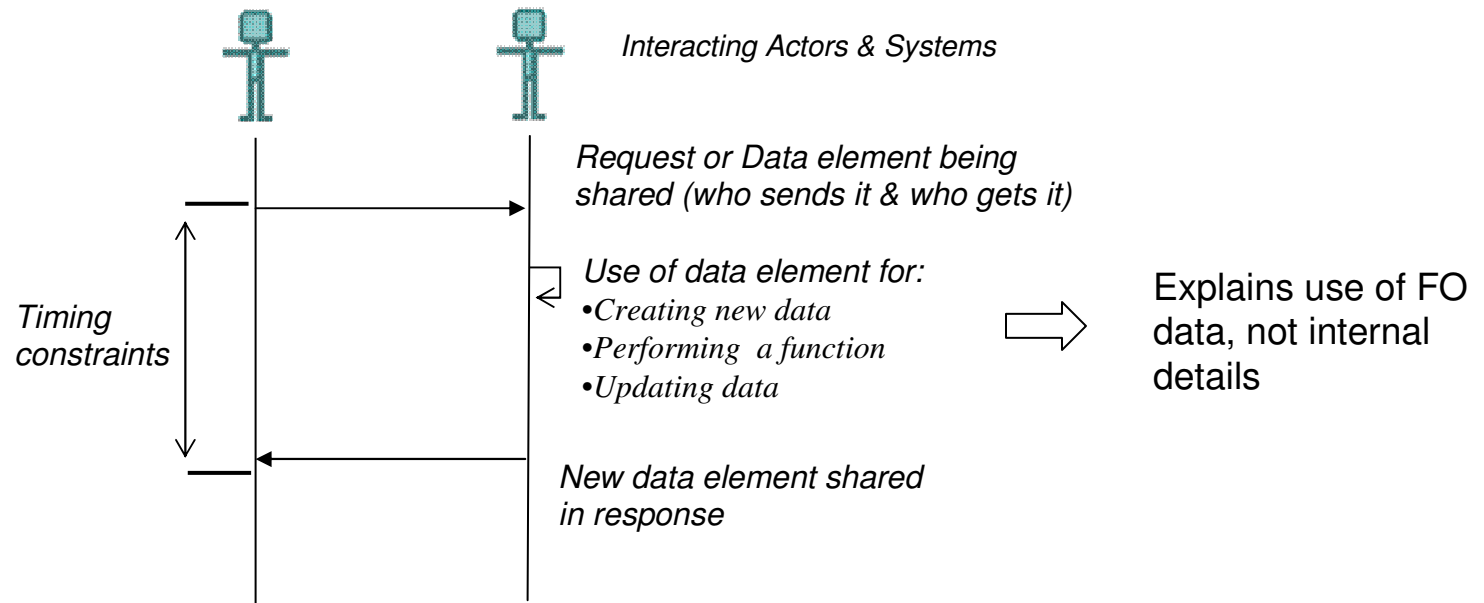- **Specify why we need the data → use cases & scenarios**

Identify Key Initial Scenarios

- **Examples of cross-domain initial scenarios:**
  - Flight creation: International, Carrier, GA
  - Single Center, multi-center, terminal / en-route
  - Off-nominal: weather (airport, en route), SUA activation / de-activation, security issue

- **Focus on cross-domain and common interactions**

High-level Scenario

Scenario: *Describe purpose*

Interacting Actors & Systems

Request or Data element being shared (who sends it & who gets it)

Timing constraints

Use of data element for:
- *Creating new data*
- *Performing a function*
- *Updating data*

Explains use of FO data, not internal details

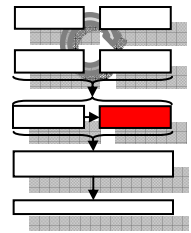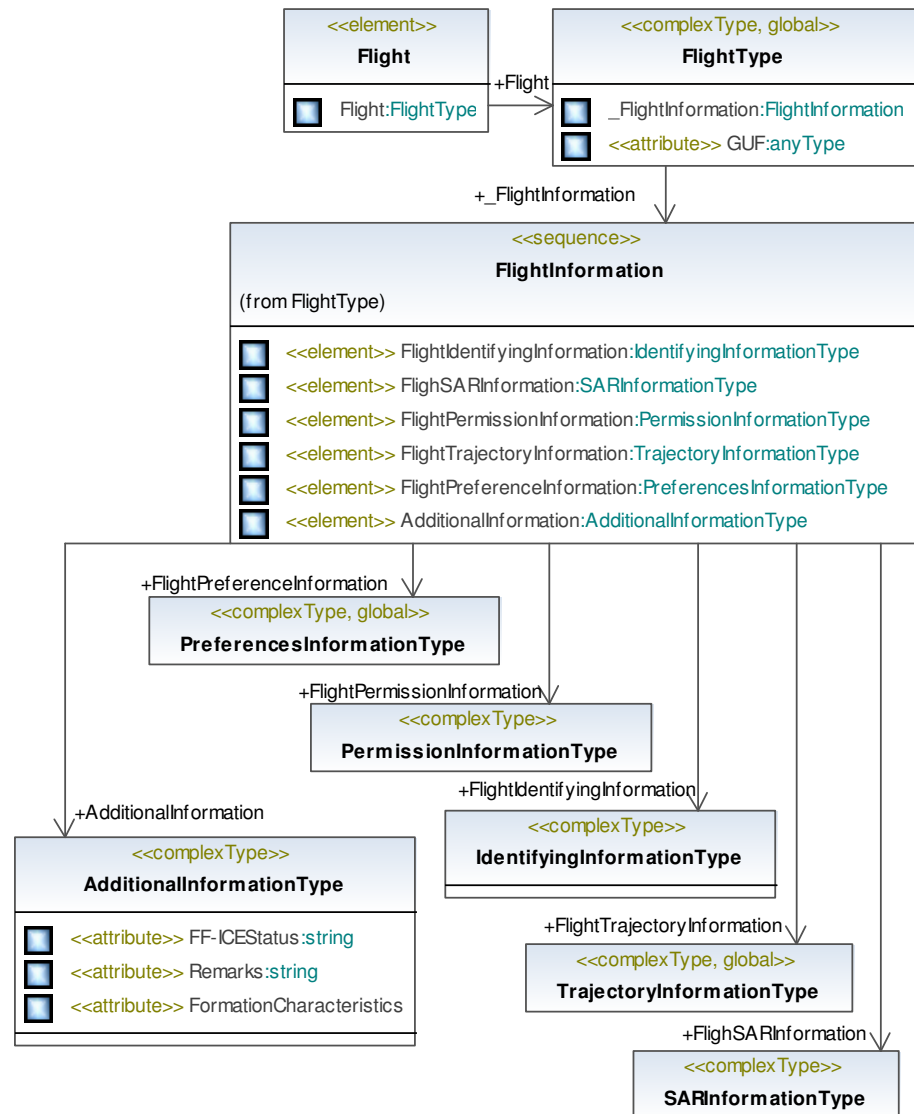*New data element shared in response*

- **Description of how data is used, created and updated**

- **May impose constraints (timing, accuracy)**

- **Derived data elements – understand update process (may require data external to FO)**

Define Data Structure


ID additional constraints (e.g., multiplicity, attributes, data type definition)

Structure a NAS Flight Object, consistent with data element definitions

Using scenarios assign data responsibilities to actors/systems:

- Data element source(s)
- Where does it live? (trades analysis required)
- Who can/should update it?
- If changes in above – what events trigger the changes?

Validate using scenarios
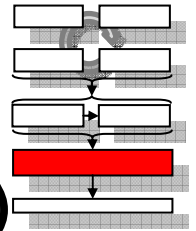
- **Expression in Universal Modeling Language (UML) facilitates <u>technical – level</u> validation:**
  - Ensure data elements are available where needed or requests are made to obtain it
  - How many transactions must be defined to get the data where it needs to be?
  - Time constraints decomposed into individual activities (includes messaging)
  - Does apportionment of data responsibilities make sense to meet scenarios?

- **Provide input for requirements allocation (performance, functional)**
- **Trade studies modify & further refine**
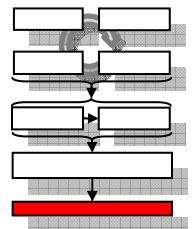
Identification of Flight Data to be Standardized

- **Between Domains (EnRoute, TFM, Terminal, etc.)**
  - TFM inventory of flight data
  - Sample Scenario: ERAM to support flight plan filing and flight tracking
  - Current flight data exchange between EnRoute and TFM
  - Future XFS flight data exchange between EnRoute and TFM
  - Tower Flight Data Manager (TFDM) flight data exchange
  - International TFM data exchange standard
  - Collaborative Decision Making data between FAA and participants
- **New Area – Security Flight Data**
- **New Area – Hazardous Cargo**

Security Flight Object – Relationship of Conceptual Information Model to Data Element Table
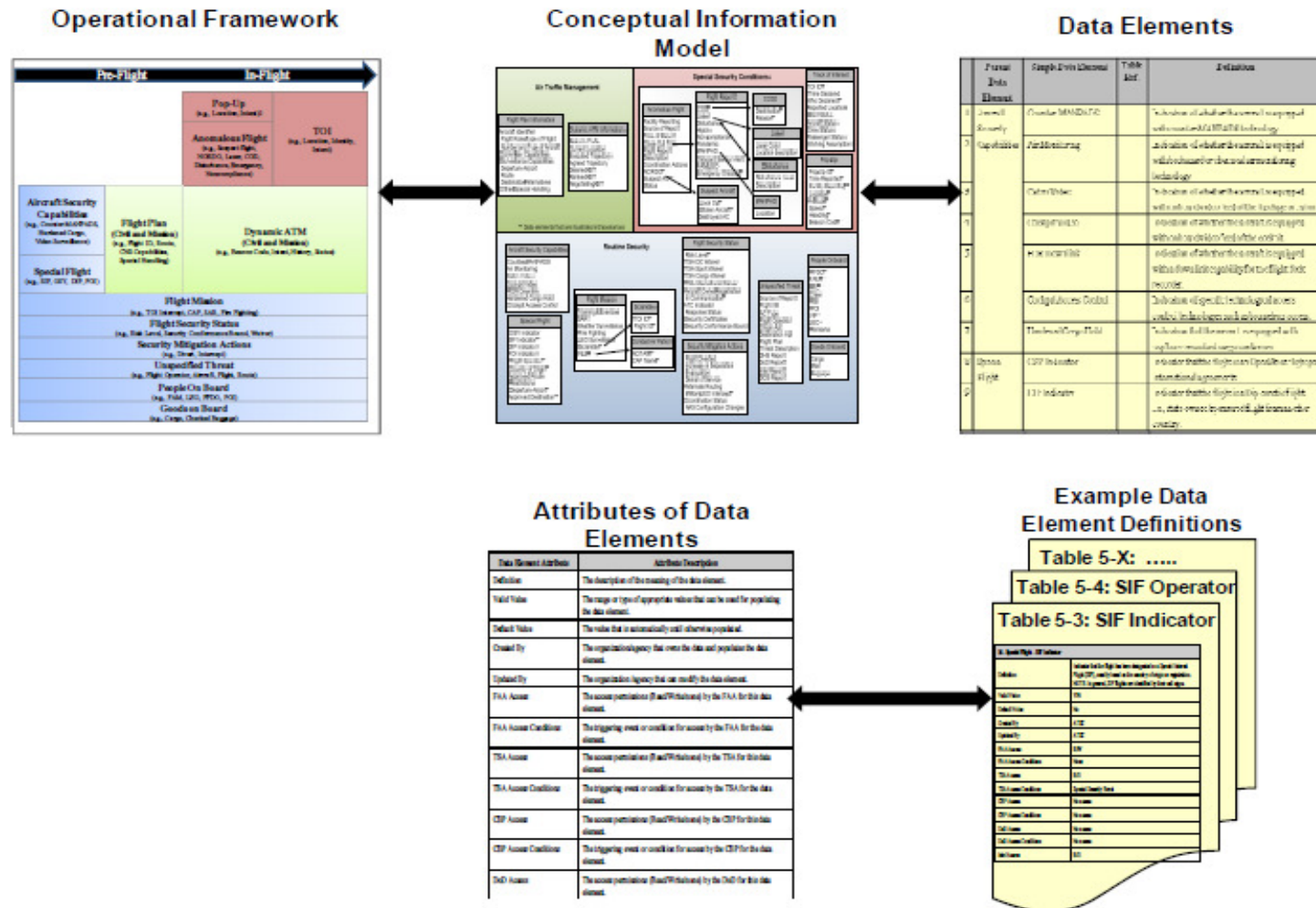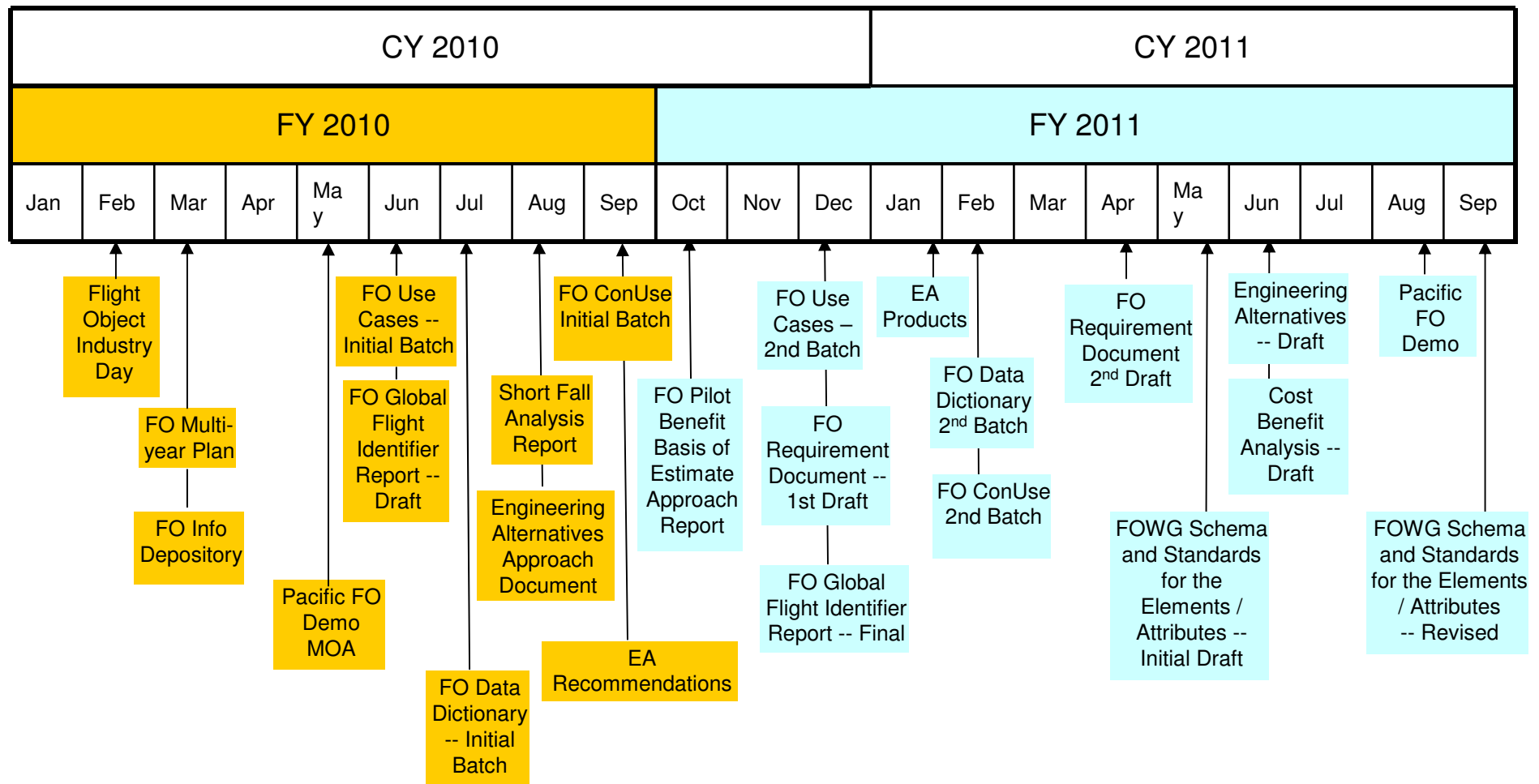
Security Data Elements (example)

Data Element	Description	Use
Flight Risk Level	Discrete indicator of relative security risk for a given flight; e.g., "low risk", "watch", "elevated risk", "high risk"	Based on severity of the risk level, generates increased scrutiny and active response actions per pre-established agreements
Flight of Interest	Informal designation of flights identified as being of security interest, but having no pre-coordinated routing or procedures (as opposed to SIF for example)	Flights with this designation will have increased scrutiny (risk level), such that any indicator or report of a security problem will result in expedited action to determine intent.
FAMS	Number of known Federal Air Marshals on board the flight; e.g., Unknown, 0, 2	Requested by FAA security from DHS for flights that indicate or report a potential security problem, to have situation awareness of potential security impacts on the NAS. Event-driven.
TOI Identifier	Unique designation for a Track of Interest; e.g., ADIZ TOI1	Used for coordination and collaboration between FAA and mission partners identifying and responding to suspect aircraft
Disturbance Report	Report from aircraft of an on-board disturbance, in accordance with the Common Strategy	Depending on other security factors, the risk level may change. Also there may be potential civil operator fleet actions (e.g., confirm secure cockpit)

Engineering Analysis

- How should flight data from different sources be correlated?

- How will the global unique flight identifier be determined?

- How de we maintain data consistency and fuse data?

- How should data be controlled and accessed?

- Where does flight data reside?

- What are the performance characteristics?

2 Year Timeline (being worked)

CY 2010									CY 2011									
FY 2010									FY 2011									
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep

Flight Object Industry Day

FO Multi-year Plan

FO Info Depository

Pacific FO Demo MOA

FO Use Cases -- Initial Batch

FO Global Flight Identifier Report -- Draft

FO Data Dictionary -- Initial Batch

Short Fall Analysis Report

Engineering Alternatives Approach Document

FO ConUse Initial Batch

EA Recommendations

FO Pilot Benefit Basis of Estimate Approach Report

FO Use Cases – 2nd Batch

FO Requirement Document -- 1st Draft

FO Global Flight Identifier Report -- Final

EA Products

FO Data Dictionary 2nd Batch

FO ConUse 2nd Batch

FO Requirement Document 2nd Draft

FOWG Schema and Standards for the Elements / Attributes -- Initial Draft

Engineering Alternatives -- Draft

Cost Benefit Analysis -- Draft

Pacific FO Demo

FOWG Schema and Standards for the Elements / Attributes -- Revised

Future Flight Object Demonstration

- **Will be assemble on experiences gained from prior research and development efforts.**

- **The objective is to identify and resolve key challenges of the global interoperability and accelerate the development of the NextGen capabilities.**

- **Key Task Elements**

  1. Initiate the Demonstration Engineering Analysis

  2. Establish Demonstration Planning and Procedures documents.

Coordination and Collaboration

- **International Coordination**
  - The Flight Object will support the ICAO Flight Plan modifications for 2012
  - The Flight Object data interchange format will leverage AIXM
  - The FAA will coordinate with other international efforts similar to the Flight Object
- **Collaboration**
  - Industries
  - Other Organizations (e.g. AVS/AFS; DoT,…)
  - Other ANSP's